C29

CHARLES MACHINE WORKS

Technical Manual

CP911 SURVEYOR®

PURCHASE RECORD:

Fill in the following information about your new Charleswater Instrument. This information will be required for Warranty Servicing:

Serial Number _____

Installation Date _____

Purchased From: _____ Factory Customer Service Rep *or*

_____ Authorized Charleswater Distributor

Purchase Order Number: _____

TECHNICAL ASSISTANCE AVAILABLE
9:00AM - 5:00PM ET
(617) 964-8370

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STATIC SURVEYOR™
MODEL CP911

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1. INTRODUCTION

This manual provides complete technical information for the Static Surveyor™ Model CP911. Please record the serial number of your unit in the space provided inside the front cover, and keep this manual for future reference. Warranty information is provided inside the back cover.

1.1 Product Description

The CP911 Static Surveyor is the smallest, non-nuclear, fully automatic static meter available. Designed for easy, reliable operation, the Surveyor features one-button operation and an auto-ranging audio alarm. Voltage is read directly from an analog meter. Charges of over 500 volts are indicated with both an audio alarm and a red LED. The Surveyor comes complete with gold-plated sensing electrodes, rechargeable battery, and battery recharger.

1.2 Key Features

- Accurate and easy to operate with state-of-the-art CMOS-LINCMOS technology
- No power cables, wires or electrical hazards to assure safe operation
- Fully automatic one-button testing
- Rechargeable batteries allow hundreds of tests per charge
- Non-nuclear design for operator safety
- Electronic auto-ranging with ultra-low drift for simple, reliable testing
- Illuminated analog meter is easy to read
- Static in excess of 500 volts is quickly identified with an audio alarm and a red light
- Two-inch calibration for accuracy at the most common test distance
- Gold-plated sensor will not corrode, assuring long meter life
- Convenient small size for maximum portability

2. SPECIFICATIONS

Static Control Characteristics	
Sensitivity Range	Two scales: Zero to 500 and Zero to 5,000 volts at 2"

General Characteristics	
Power Supply	Rechargeable, 10.8 volt battery (included)
Electrode	Gold-plated
Temperature Range	
Operating	40°F to 120°F (10C to 40C)
Storage	(-15C to +60C)
Relative Humidity	0% to 90% (non-condensing)
Operation	Capacitive field-induced
Readout	Analog meter (dual scale)
Resolution	Lower, 50 volts; higher, 500 volts
Accuracy	±10%
Repeatability	±5%
Weight	5 ounces
Dimensions	4.7" x 2" x 1.25"

3. INSTALLATION

The CP911 Static Surveyor™ is a portable instrument requiring no installation. A convenient vinyl carrying case is available from your Charleswater distributor for stowing the meter when not in use.

Always inspect your instrument's packing carton for signs of damage. If there are any signs of damage from shipping, you may want to contact the carrier to file a claim. Each carton should contain an undamaged Surveyor (with a 10.8 volt rechargeable battery installed), a 110 volt battery charger, and a technical manual. A 220 volt battery recharger/power supply is available separately.

4. OPERATION INSTRUCTIONS

The Surveyor features capacatively field-induced operation to measure ambient static charges. Fully automatic, with one button activating both the zero reference and the test sensor, this static meter is easy to use.

4.1 General Procedure

The CP911 meter is extremely sensitive and, therefore, will be affected by charges on the operator and to static-generating friction caused by motion. For best results, the operator should be grounded and avoid sudden or excessive motion while making measurements.

The Surveyor is calibrated for accuracy at a 2" distance.

A. Before making a test, hold the Surveyor *away* from the object to be measured and press the white button to turn the unit on. The meter will automatically set the zero reference.

B. While depressing the test button, bring the Surveyor up to within two inches of the object to be measured and take note of the meter reading. Should the measurement exceed 500 volts (either positive *or* negative), the unit will switch to auto-range and an audio alarm will sound indicating that the meter reading should be multiplied by 10.

4.2 Power

Your Surveyor is shipped with a battery installed. The battery may need an initial charging. When the battery needs recharging, the illumination in the meter goes out. To recharge, simply plug the recharger (supplied with your meter) into a grounded outlet and attach it to the meter at the jack on the right side. Allow the battery to recharge for at least 12 but no more than 72 hours.

5. MAINTENANCE

Your Surveyor will require very little maintenance, and there are few user-serviceable parts. If your meter requires service beyond the simple procedures described below, refer to Section 6 for further information.

5.1 Suggested Schedule

The schedule below is suggested for routine care of your Surveyor.

CYCLE	*MAINTENANCE MEASURE*
3 months	Clean electrode (Section 5.2)
6 months	Check calibration (Section 5.3)
12 months	Clean electrode (Section 5.2)
	Check calibration (Section 5.3)
	Check battery (Section 4.2)

5.2 Electrode Cleaning

To assure accurate measurements, the electrode should be kept clean. *Taking care to unplug the power pack,* clean the gold-plated electrode plate with a cotton swab soaked in isopropyl alcohol. *Always exercise extreme caution when using flammable solvents like alcohol.* Check the plate for cracks or scratches, and make sure the plate is seated firmly in the meter. If the plate is loose, the meter should be returned to the factory for servicing (see Section 6).

5.3 Checking Calibration

This section provides instructions for checking your meter's calibration. *This operation requires the use of a high-voltage power supply and, therefore, should be performed only by a qualified service technician trained in high-voltage safety procedures.*

Required Equipment (refer to Figure 1 on the next page):

- One 10" x 10" x 1/8" conductive plate (e.g. aluminum or steel), with a #30 hole drilled in the lower left corner.
- One high-voltage power supply, adjustable to both ±300 and ±-3000 Vdc. *For safety, make sure the power supply is current-limited.*
- One 5" x 3" x 1" insulating block (e.g. Teflon, Kel-F or Plexiglass) with a 1/8" wide x 1/2" deep slot cut lengthwise (see Figure 1).
- One grounded static control Wrist Strap (CP408 or equivalent)

Assemble the test fixture as shown in Figure 1: insert the conductive plate into the slotted insulating block so that the block acts as a stand. The hole in the plate should be at the bottom left. For greater test accuracy, a stand may be made to hold the Surveyor exactly 2" away from the conductive plate, as long as the stand does not obstruct the sensor in any way. This configuration of test fixtures may be used for almost any static field meter if you take care to set up with the

appropriate calibration distance: some meters are set for 2" and others at 4". The CP911 is set at 2". Refer to the manufacturer's instructions for the calibration distance. This fixture may also be used for re-scaling the CP911 for any measurement distance. Refer to Section 5.4 for information about calibrating your meter.

Prepare the meter for testing by fully charging the battery (allow at least 12 hours for recharging).

Please read the instructions on the following page completely before proceeding. *Death due to electrical shock is possible any time high voltage is used: these procedures should be performed only by a qualified service technician trained in high voltage safety procedures.*

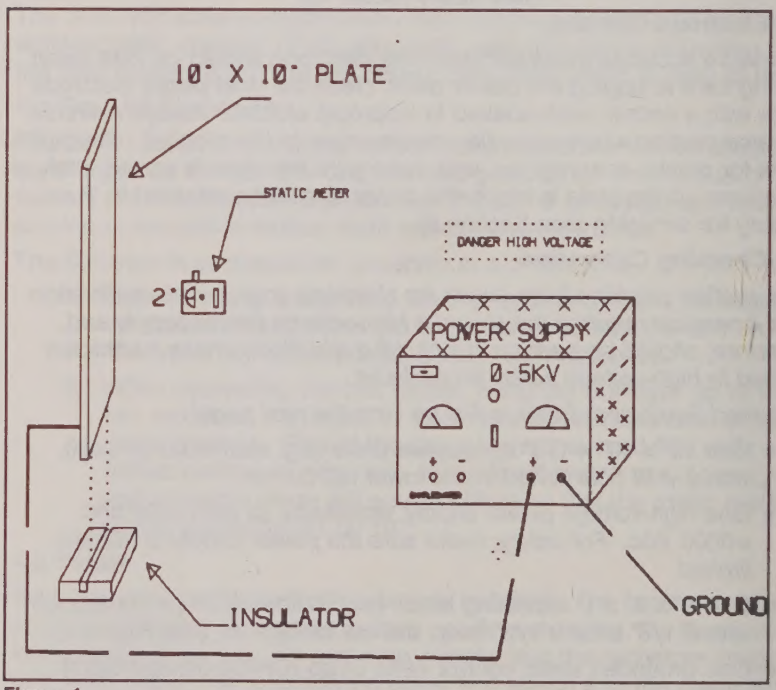

Figure 1

Danger: This calibration check should be performed only by a qualified service technician trained in high voltage safety procedures.

A. *Disconnect* the power to the high-voltage supply.

B. Connect the output lead from the power supply to the hole in the conductive plate.

C. Plug in the power supply and adjust the output voltage to +3000. Then turn the power *off.*

D. *Wearing a grounded static control Wrist Strap,* place the CP911 2" away from the center of the conductive plate.

E. Depress the "On" button on the static meter with one hand while turning on the power supply with the other.

F. The meter's audio alarm and red "x10" LED should activate, and the meter should read approximately +3000 volts (300 x 10 for the multiplier).

G. Repeat steps C through F with the power supply set at -3000 Volts. Be sure to shut off the power supply and discharge the plate before each measurement.

H. Repeat this procedure with the power supply set at +300 Vdc. The reading should be approximately +300 Vdc, and the alarm should *not* sound.

I. Repeat with the power supply set at -300 Vdc.

If you have difficulty with this procedure, try leaving the power supply on after setting it, zeroing the meter by holding it away from the plate while pushing the "On" button. Move the meter up to the 2" point for the test.

If your Surveyor does not produce accurate measurements, refer to the next section and recalibrate the meter.

5.4 Calibration Procedure

If you find that your Surveyor requires calibration, please follow the instructions provided below, using the test set-up described in Section 5.3. It may be necessary to repeat the steps two or three times. Refer to Figure 2 on page 7 for placement of trimmers.

A. Make sure the metal plate has been discharged. Holding the Surveyor away from any charged objects, push the white test button and note the reading. The meter should indicate zero volts. If not, turn trimmer #1 until zero reading is achieved. *Release the test button before each adjustment.*

B. Set the power supply for 300 volts. Push the test button and bring the Surveyor up to the 2" mark from the charged plate. The reading should be 300. If not, adjust trimmer #2 until the correct reading is achieved. Reset the meter after each adjustment by releasing the button and pulling away.

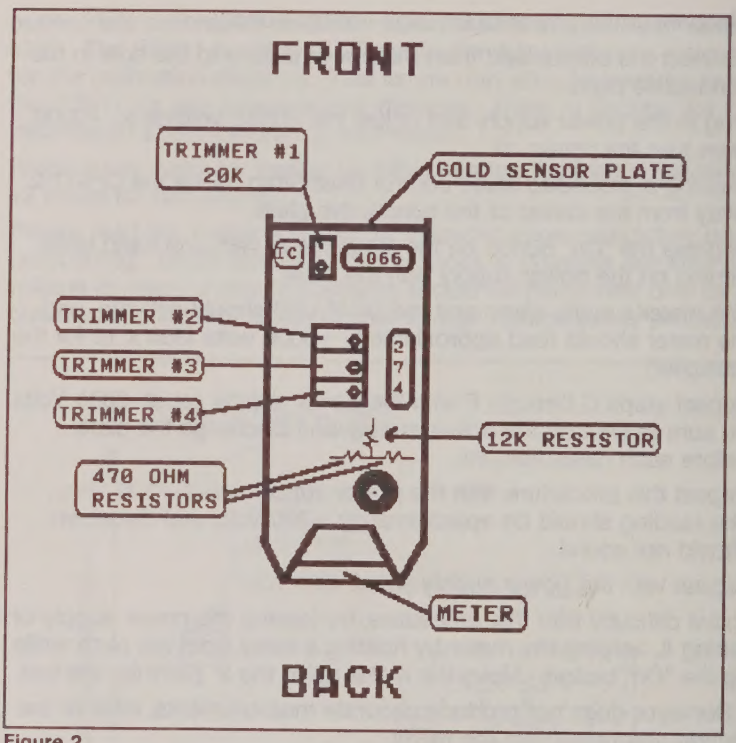

Figure 2

C. Set the power supply to 3000 volts. Holding the meter away from the plate, push the test button. Slowly bring the Surveyor near the plate until the meter reads just above the 500 volt mark. The alarm should come on. If not, adjust trimmer #3 (CCW) until the alarm *just* starts to come on. Repeat this procedure for negative 3000 volts and adjust trimmer #4 (CW) until the alarm *just* triggers.

D. Now that the alarm and auto-ranging has been set (step C), bring the Surveyor up to the 2" point and check the reading. If the reading is incorrect, the value of the R2 resistor (now 12K) must be changed and the entire calibration procedure repeated. (Some units are equipped with a 20k trimmer in place of the R2 resistor. This trimmer may be adjusted.)

It is recommended that you check calibration at least annually.

5.5 Troubleshooting

The following suggestions are intended to help you determine whether your Surveyor requires servicing. If your meter needs repairs, consult the Warranty information provided inside the back cover of this manual. If you have any questions, please take advantage of our free technical assistance by calling (617)964-8370.

SYMPTOM	*CAUSE*	*CURE*
Excessive drift	Humidity	Allow unit to stabilize in a warm, dry environment
	Direct static discharge to sensor	Return to the factory for servicing
Meter face not illuminated	Low battery	Recharge battery (Section 4.2)
Illumination goes out during tests	Low battery	Recharge battery (Section 4.2)
Meter seems to give high results	Meter not zeroed	Release white button between tests
	Meter out of calibration	Recalibrate (Section 5.4)
Erratic operation	Meter not zeroed in static-free space	Read Operation Instructions (Section 4)

6. PARTS & SERVICE

There are no user-serviceable parts in the Surveyor. Servicing other than battery-charging should be performed only at the factory.

6.1 Standard Parts List

The following parts list is supplied to conform with certain industry standards. Most parts are available only to owners of Surveyor units which are no longer under warranty. Charleswater Products makes no warranty, express or implied, nor accepts any obligation, liabilities or responsibilities in connection to repairs to Surveyors, or replacement of Surveyor parts, outside of Charleswater's factory.

Prices listed are subject to change without notice.

Stock No.	*Description*	*Quantity*	*Price*
CY-911-005	Surveyor Box	1	$ 40.00
CZ-906-020	110 volt battery charger	1	16.00
CZ-906-060	Trimmer, 20k, 25 turn	5	5.00
CZ-906-071	Capacitor, 22mf	1	0.75
CZ-906-085	Yellow LED	1	0.75
CZ-906-030	TLC 274 Quad IC	1	3.50
CZ-906-115	Battery, 10.8 vdc	1	16.00
CZ-911-005	Buzzer (audio alarm)	1	5.00
CY-911-007	Printed Circuit Board	1	98.00
CZ-911-010	DPDT Switch	1	12.00
CZ-911-015	5 Volt Reg IC	1	10.00
CZ-911-025	4066 Integrated Circuit	1	2.00
CZ-911-027	T-1 Red LED	1	0.75
CZ-911-030	271 OP AMP	1	5.00
CZ-911-035	Sensor Board	1	10.00
CZ-911-040	7.5 Volt Zener Diode	1	0.80
CZ-911-050	1N 914 Diode	2	0.75
CZ-911-055	10K Resistor	1	0.75
CZ-911-060	1Meg Resistor, 1/4 1/8	1	0.75
CZ-911-062	Socket, 1/8 Mini	1	1.50
CZ-911-065	10Meg Resistor	1	0.75
CZ-911-067	100K Resistor	1	0.75
CZ-911-068	12K 1/8 Watt Resistor*	1	0.75
CZ-911-099	Meter, dual scale	1	15.00
CP925CARRY	Vinyl Carrying Case		8.00
CP954	220 volt battery charger		35.00

* In some cases this resistor has been replaced with a 20k trimmer.

All parts are warranted to be free from defect, but Charleswater accepts no responsibility or liability in connection with repairs to Surveyors made outside of Charleswater's factory.

6.2 Service Information

Free technical assistance is available for any question involving the operation of our product: please call (617) 964-8370.

Service required as a result of misuse, abuse or negligence is not covered by our Warranty. Unauthorized modification of the unit will void all Warranties in their entirety. Our Warranty excludes reimbursement for inconvenience, installation, set-up time, loss of use, or unauthorized service. The Warranty covers only products made at the Charleswater factory, and is not extended to cover other equipment or parts that may be used with the unit. *Performance malfunctions involving the use of non-Charleswater equipment are the owner's responsibility.*

CALIBRATION

Any CP911 Surveyor may be returned to the factory for calibration. There is a $29.00 flat fee for factory calibration: shipping costs are not included in this fee, and must be paid by the owner. Contact our Customer Service Department at (617)964-8370 for a Return Material Authorization. Written Purchase Orders are required for calibration services.

WARRANTY REPAIRS

Our Warranty begins on the date you purchase your Surveyor. Damage incurred during shipment is the responsibility of the freight carrier. You must supply proof of purchase when requesting service or parts. See the instructions provided inside the back cover.

OUT-OF-WARRANTY REPAIRS

There is a $45.00 flat base rate for any out-of-warranty repairs involving normal wear and tear. Replacement parts for unusual or extraordinary repairs will be charged at current parts prices. All factory repairs carry a limited 90-day guarantee. Owners are responsible for all shipping charges, and must obtain a Return Material Authorization (RMA) Number from Charleswater prior to sending any equipment for repair. Written Purchase Orders are required for all out-of-warranty repairs.

WARRANTY

Charleswater Products, Inc. warrants this instrument to be free from defects in materials or workmanship upon leaving the factory until one year from the date of purchase.

Charleswater will, under this Warranty, repair or replace any unit which proves upon our examination to have become defective within the Warranty period. A one-year Warranty applies to this unit. The unit should be returned *by the purchaser* to Charleswater Products, Inc. at 93 Border Street, West Newton, MA 02165. Transportation must be prepaid, and the unit must be insured for its full purchase price. Prior to returning any goods for any reason, contact Customer Service at (617) 964-8370. If the unit was purchased direct from the factory, Customer Service will issue a Return Material Authorization (RMA) number. This number must accompany all returns. If the unit was purchased from one of Charleswater's Authorized Distributors, you must return the unit to that Distributor, who will process the unit for servicing. This Warranty does not apply when the instrument has been abused or damaged, misused, improperly installed, altered, connected to improper line voltage, or has been serviced by anyone other than an authorized factory representative.

Charleswater Products makes no Warranty, express or implied, nor accepts any obligation, liabilities or responsibility in connection with the use of this product other than the repair or replacement of parts as stated herein.

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